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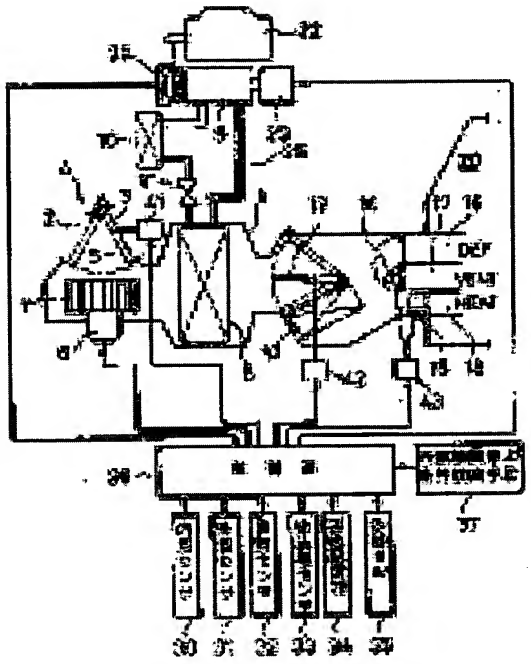
(54) AIR CONDITIONER FOR VEHICLE

(57)Abstract:
PROBLEM TO BE SOLVED: To reduce an uncomfortable feeling of variation in cooling capacity produced when a compressor power source used in an on-vehicle refrigerating cycle is switched from a vehicle traveling drive device to a motor.
SOLUTION: This air conditioner for a vehicle is formed so that a drive source for driving a compressor 9 of a refrigerating cycle 25 mounted on a vehicle can be switched between an internal combustion engine 22 and a compressor driving motor 23 different from the internal combustion engine 22. After the conditions for stopping the internal combustion engine 22 are judged to be established, the cooling capacity when the compressor 9 is driven by the internal combustion engine 22 is moved steppingly to that when the compressor 9 is driven by the motor 23. After that, the drive source of the compressor 9 is switched from the internal combustion engine 22 to the motor 23.



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[Claim(s)]

[Claim 1] The air conditioner for vehicles which changed the driving source for driving the compressor of a refrigerating cycle which is characterized by providing the following, and which is carried in vehicles by different motor for a compressor drive from the driving gear for rolling stock runs, and this driving gear for a run. A judgment means to judge that the conditions which suspend the aforementioned driving gear for a run were ready. A cooling capacity shift means to step on a stage to the cooling capacity in the case of driving the aforementioned compressor for the cooling capacity in the case of driving the aforementioned compressor by the aforementioned motor, and to make it shift to it with the aforementioned driving gear for a run after being judged with the conditions which suspend the aforementioned driving gear for a run by the aforementioned judgment means having been ready. The compressor driving source change means which changes the driving source of the aforementioned compressor from the aforementioned driving gear for a run to the aforementioned motor after shifting to the cooling capacity in the case of driving the aforementioned compressor by the aforementioned motor by the aforementioned cooling capacity shift means.

[Claim 2] While controlling air-conditioning equipment and adjusting cooling capacity, the driving source for driving the compressor of a refrigerating cycle In the air conditioner for vehicles changed by different motor for a compressor drive from the driving gear for rolling stock runs, and this driving gear for a run A judgment means to judge that the conditions which suspend the aforementioned driving gear for a run were ready, The 1st target cooling capacity operation means which calculates target cooling capacity in case the aforementioned compressor drives with the aforementioned driving gear for a run, The 2nd target cooling capacity operation means which calculates target cooling capacity in case the aforementioned compressor drives by the aforementioned motor, After being judged with the conditions which stop the source of power of the aforementioned vehicles by the aforementioned judgment means having been ready A cooling capacity shift means to control the aforementioned air-conditioning equipment to step on a stage to the target cooling capacity calculated with the target cooling

capacity operation means of the above 2nd, and to shift to it from the target cooling capacity which calculated cooling capacity with the target cooling capacity operation means of the above 1st, By the aforementioned cooling capacity shift means The air conditioner for vehicles characterized by having the compressor driving source change means which changes [it was come to complete cooling capacity to the target cooling capacity calculated with the target cooling capacity operation means of the above 2nd] the driving source of the aforementioned compressor from the aforementioned driving gear for a run to the aforementioned motor case.

[Claim 3] The air conditioner for vehicles according to claim 1 or 2 characterized by making so short that the change frequency of the aforementioned driving source being high time after being judged with the conditions which stop the source of power of the aforementioned vehicles by the aforementioned judgment means having been ready, until shift of the cooling capacity by the aforementioned cooling capacity shift means is started.

[Claim 4] It is the air conditioner for vehicles according to claim 1 characterized by performing shift of the cooling capacity by the aforementioned cooling capacity shift means when a difference with cooling capacity in case the aforementioned compressor drives by cooling capacity and the aforementioned motor in case the aforementioned compressor drives with the aforementioned driving gear for a run is more than a predetermined size.

[Claim 5] It is the air conditioner for vehicles according to claim 2 characterized by performing shift of the cooling capacity by the aforementioned cooling capacity shift means when the difference of the target cooling capacity calculated with the target cooling capacity operation means of the above 1st and the target cooling capacity calculated with the target cooling capacity operation means of the above 2nd is more than a predetermined size.

[Detailed Description of the Invention]

[0001]

[The technical field to which invention belongs] This invention relates to the air conditioner for vehicles which changed the compressor of a refrigerating cycle carried in vehicles by different motor for a compressor drive from the driving gear for rolling stock runs, and this driving gear for a run.

[0002]

[Description of the Prior Art] In vehicles which the internal combustion engine used for a run suspends temporarily like an idle stop vehicle or a hybrid car, when the

compressor which makes an internal combustion engine a driving source is used by the refrigerating cycle, there is un-arranging [from which cooling capacity for a refrigerating cycle to stop working and obtain during a halt of an internal combustion engine is no longer obtained]. For this reason, in the former, the compressor of the air conditioner for vehicles as shown in JP,9-324668,A, for example is well-known.

[0003] This changes the driving source of the compressor of the required shell which maintains cooling capacity, and a refrigerating cycle to a motor from an internal combustion engine, even if an internal combustion engine stops, and it continues making it make it drive a compressor by this motor during a halt of the vehicles by the waiting for a signal etc.

[0004]

[Problem(s) to be Solved by the Invention] However, since it is small generally compared with the driving force of an internal combustion engine, the driving force of a motor is in the state where the compressor drove and air conditioning of the vehicle interior of a room was maintained by the internal combustion engine until now. There is un-arranging [which it becomes impossible to maintain the cooling capacity obtained when the driving source of a compressor was suddenly changed from the internal combustion engine to the motor and the compressor was driven with the internal combustion engine, causes rapid elevation of the blowdown air temperature to a vehicle room, and gives displeasure]. Although what is necessary is just to enlarge driving force of a motor in order to avoid this, if it asks for a motor of the same grade as the driving force of an internal combustion engine, the power consumption of a motor will increase remarkably, and a motor will be enlarged, and fault, like reservation of an installation space becomes difficult will arise.

[0005] Then, in this invention, it is making into the technical problem to offer the air conditioner for vehicles which can reduce the displeasure accompanying change of the cooling capacity produced in case the driving source of a compressor changes from the driving gear for a run to a motor in the air conditioner for vehicles which changes the source of power of the compressor used for the refrigerating cycle for mount by the driving gear for a run and motors, such as an internal combustion engine.

[0006]

[Means for Solving the Problem] In order to attain the above-mentioned technical problem, the air conditioner for vehicles concerning this invention In the air conditioner for vehicles which changed the driving source for driving the compressor of a refrigerating cycle carried in vehicles by different motor for a compressor drive from the driving gear for rolling stock runs, and this driving gear for a run A judgment means to

judge that the conditions which suspend the aforementioned driving gear for a run were ready, After being judged with the conditions which suspend the aforementioned driving gear for a run by the aforementioned judgment means having been ready A cooling capacity shift means to step on a stage to the cooling capacity in the case of driving the aforementioned compressor for the cooling capacity in the case of driving the aforementioned compressor by the aforementioned motor, and to make it shift to it with the aforementioned driving gear for a run, After shifting to the cooling capacity in the case of driving the aforementioned compressor by the aforementioned motor by the aforementioned cooling capacity shift means, it is characterized by having the compressor driving source change means which changes the driving source of the aforementioned compressor from the aforementioned driving gear for a run to the aforementioned motor (claim 1).

[0007] Therefore, since the driving source of a compressor does not necessarily change to a motor suddenly after the conditions which suspend the driving gear for a run are ready, and cooling capacity will change after it steps on a stage to cooling capacity in case a compressor drives by the motor and shifts to it, even if it is the case where the driving force of a motor differs from the driving force of the driving gear for a run, the displeasure accompanying a rapid change of cooling capacity is avoidable. Moreover, according to such control, the air conditioner for vehicles which can reduce the time worked for air conditioning of the driving gear for a run, and can reduce the load of the driving gear for a run can be offered, reducing the displeasure accompanying change of cooling capacity.

[0008] While controlling air-conditioning equipment and adjusting cooling capacity as a more concrete example of composition of above-mentioned composition In the air conditioner for vehicles which changed the driving source for driving the compressor of a refrigerating cycle by different motor for a compressor drive from the driving gear for rolling stock runs, and this driving gear for a run A judgment means to judge that the conditions which suspend the aforementioned driving gear for a run were ready, The 1st target cooling capacity operation means which calculates target cooling capacity in case the aforementioned compressor drives with the aforementioned driving gear for a run, The 2nd target cooling capacity operation means which calculates target cooling capacity in case the aforementioned compressor drives by the aforementioned motor, After being judged with the conditions which stop the source of power of the aforementioned vehicles by the aforementioned judgment means having been ready A cooling capacity shift means to control the aforementioned air-conditioning equipment to step on a stage to the target cooling capacity calculated with the target cooling

capacity operation means of the above 2nd, and to shift to it from the target cooling capacity which calculated cooling capacity with the target cooling capacity operation means of the above 1st, By the aforementioned cooling capacity shift means You may make it have the compressor driving source change means which changes [it was come to complete cooling capacity to the target cooling capacity calculated with the target cooling capacity operation means of the above 2nd] the driving source of the aforementioned compressor from the aforementioned driving gear for a run to the aforementioned motor case (claim 2).

[0009] After the conditions which suspend the driving gear for a run are ready in such composition Since the driving source of a compressor is changed from the driving gear for a run to a motor after cooling capacity steps on a stage to the target cooling capacity calculated with the 2nd target cooling capacity operation means and shifts to it from the target cooling capacity calculated with the 1st target cooling capacity operation means In the process at which the driving source of a compressor changed from the driving gear for a run to the motor, a rapid change of cooling capacity is lost and the displeasure accompanying a rapid change of cooling capacity can be avoided.

[0010] Moreover, in above-mentioned composition, after being judged with the conditions which stop the source of power of vehicles by the judgment means having been ready, you may be made to make time until shift of the cooling capacity by the cooling capacity shift means is started so short that the change frequency of the aforementioned driving source be high (claim 3).

[0011] According to such composition, when the driving source of a compressor is changed from the driving gear for a run to a motor, time until it starts shift of cooling capacity according to the change frequency of the driving source of a compressor is adjusted. That is, it is necessary to make sense of incongruity hard to avoid the most frequent possible change and to sense, since somesthesis is used to cooling capacity when the compressor is driving [change frequency] with the driving gear for a run to the low case. Then, in such a case, it is lengthening time until shift of the cooling capacity by the cooling capacity shift means is started, and the shift to the motor of a driving source is suppressed as much as possible. On the contrary, since the vehicle interior of a room is approaching the air conditioning state when the compressor is driving by the motor to some extent when change frequency is high, even if it shortens time until shift of cooling capacity is started, the load of the driving gear for a run is reduced by not injuring somesthesis, bringing shift of cooling capacity forward in this case, and switching the driving source of a compressor to a motor.

[0012] Furthermore, you may be made to carry out when a difference with cooling

capacity in case a compressor drives by cooling capacity and a motor in case a compressor drives shift of the cooling capacity by the cooling capacity shift means with the driving gear for a run is more than a predetermined size (claim 4). More specifically, when the difference of the target cooling capacity calculated with the 1st target cooling capacity operation means and the target cooling capacity calculated with the 2nd target cooling capacity operation means is more than a predetermined size, you may be made to perform shift of the cooling capacity by the cooling capacity shift means (claim 5).

[0013] When a difference with cooling capacity in case a compressor drives by cooling capacity and a motor in case a compressor drives with the driving gear for a run is small, even if it switches the driving source of a compressor to a motor suddenly from the driving gear for a run, a possibility of producing the sense of incongruity accompanying change of cooling capacity is small. Then, the above-mentioned control which switches the driving source of a compressor to a motor from the driving gear for a run after stepping on a stage to the cooling capacity in the case of driving a compressor and making it shift to it by the motor from the cooling capacity in the case of driving a compressor in the driving gear for a run serves as effective composition especially, when a difference with cooling capacity in case a compressor drives by cooling capacity and a motor in case a compressor drives with the driving gear for a run is more than a predetermined size.

[0014]

[Embodiments of the Invention] Hereafter, a drawing explains the gestalt of implementation of this invention. In drawing 1 , the air-conditioning control unit for vehicles has the intake transfer device 4 which equipped the best style side of the air-conditioning duct 1 with the bashful inlet 2 and the open air inlet 3, and an introductory rate with the open air is adjusted by the intake door 5 as it is bashful. It is prepared so that the blower 7 which rotates by the motor 6 may attend the aforementioned inlet, and by rotation of a blower 7, into the air-conditioning duct 1, air is attracted from an inlet, and it feeds to a downstream into it.

[0015] An evaporator 8 is allotted, and in the downstream of a blower 7, piping combination is carried out with a compressor 9, a capacitor 10, the expansion bulb 11, etc., and this evaporator 8 constitutes the refrigerating cycle 25, and cools to it the air which supplies a refrigerant to an evaporator 8 by operation of a compressor 9, and passes this evaporator 8.

[0016] The heater core 12 which makes the cooling water of an internal combustion engine a heat source is arranged at the downstream of an evaporator 8, and the air mix door 13 is allotted before this heater core 12. The rate of the air to which the air which

passed the evaporator 8 passes the heater core 12 by this air mix door 13, and the air which bypasses this is adjusted.

[0017] And air in which the ** tone was carried out by the evaporator 8 and the heater core 12, It is ventilated at the outlet (defrost outlet 16, vent outlet 17, foot outlet 18) empty-vehicle room 20 opened and closed by the mode doors 14 and 15 prepared in the lowest style side of the air-conditioning duct 1.

[0018] ON/OFF of the transfer of the driving force from an internal combustion engine 22 is carried out by the aforementioned compressor 9 being able to receive driving force now from an internal combustion engine 22 through an electromagnetic clutch 21, and carrying out ON/OFF control of the electromagnetic clutch 21. Moreover, the motor 23 for a compressor drive is directly linked with the driving shaft of a compressor 9, and ON/OFF of the transfer of the driving force from a motor 23 to a compressor 9 is carried out by being able to receive driving force now also from this motor 23, and carrying out ON/OFF control of the energization to a motor 23. And the driving source of a compressor 9 can be switched to a motor 23 from an internal combustion engine 22 by ON/OFF control of these electromagnetic clutches 21, and ON/OFF control of the energization to a motor 23, or it can switch now to an internal combustion engine 22 from a motor 23.

[0019] The open air sensor by which the bashful sensor by which 30 detects the degree of vehicle room air temperature, and 31 detect vehicle outdoor temperature, The sun sensor to which 32 detects intensity of radiation, the ****** sensor which detects the air temperature which inhaled 33 in the air-conditioning duct, The temperature setter to which 34 sets the target temperature of the vehicle interior of a room, and 35 are the various switches for carrying out a manual setup of the various air-conditioning operation, and the detecting signal from these sensors, the setpoint signal from a temperature setter, and the signal from various switches are inputted into a control section 36. Moreover, the signal from an internal combustion engine condition precedent detection means 37 to detect that the conditions which stop an internal combustion engine were fulfilled etc. is inputted into a control section 36. Here, especially as an internal combustion engine condition precedent detection means 37, although not limited, what detects that the conditions which stop an internal combustion engine 22 with detection of the vehicle speed having become zero were fulfilled can be considered using the vehicle speed sensor which detects the vehicle speed.

[0020] While a control section 36 is equipped with the arithmetic and program control (CPU) which is not illustrated, a read only memory (ROM), a RAM (RAM), input/output

port (I/O), etc. The roll control of a blower 7, drive control of the actuators 41, 42, and 43 which drive various doors (an intake door 5, the air mix door 13, mode doors 14 and 15), Have ON/OFF control of the electromagnetic clutch 21 of a compressor 9, the roll control of the motor 23 for a compressor drive, the drive circuit to this motor 23 that performs ON/OFF control of energization, and it is constituted. Various input signals are processed according to the predetermined program given to ROM, and the change of ventilation capacity, the change in inhalation mode, a switch of the driving source of a compressor 9, a switch in blow-off mode, the opening of the air mix door 13, etc. are controlled.

[0021] The example of air-conditioning control by the above-mentioned control section 36 is shown in drawing 2 as a flow chart, and the example of air-conditioning control of operation is explained based on this flow chart below.

[0022] A control section 36 inputs various sensors (the bashful sensor 30, the open air sensor 31, sun sensor 32 grade), the signal from the temperature setter 34, etc. through the initialization processing which is not illustrated, after an air conditioner works (Step 50). And the degree X1 of target blow-off temperature permitted based on the signal from these various sensors or setting temperature when the driving source of a compressor 9 is an internal combustion engine 22 is calculated (Step 52). Moreover, the degree X2 of target blow-off temperature permitted based on the signal from the various aforementioned sensors or the capacity of a motor 23 when the driving source of a compressor 9 is a motor 23 is calculated (Step 54). Since the drive capacity of the compressor 9 by the motor 23 is small compared with the drive capacity of the compressor 9 by the internal combustion engine 22, X1 becomes low generally rather than Xtwo (X1<X2).

[0023] And in the following step 56, it judges whether the condition precedent of an internal combustion engine 22 was attained. This judgment is what judges whether the signal for detecting that the conditions which stop an internal combustion engine 22 by the internal combustion engine condition precedent detection means 37 of drawing 1 were fulfilled was inputted. When judged with the condition precedent of an internal combustion engine 22 having not attained, (when the signal outputted from the internal combustion engine condition precedent detection means 37 when the conditions which stop an internal combustion engine 22 are fulfilled is not inputted) The usual air-conditioning control (internal combustion engine drive space-time tone control) which ON and energization to a motor 23 are turned [control] OFF for an electromagnetic clutch 21, and makes a compressor 9 drive with an internal combustion engine 22 is performed.

[0024] on the other hand, when judged with the condition precedent of an internal combustion engine 22 having attained, (when the signal outputted from the internal combustion engine condition precedent detection means 37 when the conditions which stop an internal combustion engine 22 are fulfilled is inputted) When it judges (Step 60) and is judged with it being smaller than the predetermined value alpha, whether the difference (deltaX=X2-X1) of the degree X1 of target blow-off temperature and the degree X2 of target blow-off temperature is smaller than the predetermined value alpha Even if it switches the driving source of a compressor 9 to a motor 23 suddenly from an internal combustion engine 22, there is no change of the big degree of target blow-off temperature. since there are few possibilities that the air temperature which blows off to the vehicle interior of a room may change a lot, and may give crew displeasure, as shown in drawing 4 (a) in this case, it is alike as usual and the driving source of a compressor 9 is promptly switched to a motor 23 from an internal combustion engine 22 That is, an internal combustion engine 22 is suspended at the same time the condition precedent of an internal combustion engine 22 attained, when judged with it being smaller than alpha at Step 60 (Step 76), and air-conditioning control (motorised space-time tone control) which makes a compressor 9 drive by the motor 23 is performed (Step 78). And the number of times switched to motorised is counted in Step 80.

[0025] The air-conditioning control at the time of motorised [which is shown in the air-conditioning control at the time of the internal combustion engine drive shown in Step 58, or Step 78] Although it does not explain in full detail since it is the same air-conditioning control as usual, if it is air-conditioning control at the time of an internal combustion engine drive For example, based on the degree of target blow-off temperature calculated at Step 52, as shown in drawing 3 Outlet control which chooses the outlet (the defrost outlet 16, the vent outlet 17, foot outlet 18) which controls the mode doors 14 and 15 and blows off ** tone air is performed (Step 82). Control the rotational frequency of the air mix door 13 or a blower 7, and blow-off air temperature is adjusted so that it may become the degree X1 of target blow-off temperature (Steps 84 and 86). Inhalation mouth control which controls an intake door 5 and chooses the inhalation mouth of air is performed (Step 88), and compressor control of the discharging volume of a compressor 9, ON/OFF, etc. is performed (Step 90). Moreover, similarly, if it is air-conditioning control at the time of motorised, as shown in drawing 3 , for example based on the degree of target blow-off temperature calculated at Step 54 Outlet control which controls a mode door and chooses the outlet of ** tone air is performed (Step 82). Control the rotational frequency of the air mix door 13 or a blower 7, and blow-off air temperature is adjusted so that it may become the degree X2 of

target blow-off temperature (Steps 84 and 86). Inhalation mouth control which controls an intake door 5 and chooses the inhalation mouth of air is performed, and compressor control of the discharging volume of a compressor 9, ON/OFF, etc. is performed (Step 90).

[0026] What is necessary is here, to blow off within the limits of predetermined to the degree of target blow-off temperature using PID control etc., and just to use the technique of controlling the controlled variable of the air mix door 13 or a blower 7 to complete air temperature etc., for example, although especially the control technique that makes blowdown air temperature the degree of target blow-off temperature is not limited.

[0027] On the other hand, in Step 60, when are judged with the difference (deltaX=X2-X1) of the degree X1 of target blow-off temperature and the degree X2 of target blow-off temperature being beyond the predetermined value alpha and the driving source of a compressor 9 is suddenly switched to a motor 23 from an internal combustion engine 22, since change of the degree of target blow-off temperature is large, there is a possibility that blowdown air temperature may change a lot and may give crew displeasure. For this reason, after processing of Step 62 to the step 74 is made in this case, processing of the aforementioned steps 76-80 is made.

[0028] That is, in Step 62, it judges [motorised / last] whether it changed and the shell predetermined time passed. The state where the compressor 9 drove with the internal combustion engine 22 continues, and this predetermined time is set as the time of the grade which gets used to air-conditioning environment when the crew of the vehicle interior of a room makes a compressor drive with an internal combustion engine 22. When judged with the predetermined time t having passed since motorised [last] in this step 62 Reset the number of times counted at Step 80 (Step 64), and the start time (time after the condition precedent of an internal combustion engine attains) T of the cooling inhibitory control mentioned later is set as the time tau on which it decided by experiment for every type of a car beforehand (Step 66). The time check of the timer used in order to judge whether predetermined-time progress was carried out at the aforementioned step 62 is reset, and it starts (Step 68).

[0029] moreover, when judged with the predetermined time having not passed since motorised [last] in Step 62 As start time (time after the condition precedent of an internal combustion engine attains) T of cooling inhibitory control The time (tau/n) which **(ed) time tau on which it decided by experiment for every type of a car beforehand by the number of times n counted at Step 80 is set up (Step 70), and the time check of the aforementioned timer is reset and it starts (Step 68).

[0030] And in the following steps 72 and 74, it is carried out until cooling inhibitory control as shown in drawing 4 (b) blows off and air temperature is in agreement with the degree of target blow-off temperature at the time of motorised within the limits of predetermined. After the condition precedent of an internal combustion engine 22 is attained and the cooling suppression start time calculated by Step 66 or 70 passes, this cooling inhibitory control It is the thing it is made to make shift to the cooling capacity permitted when cooling capacity is weakened gradually and a compressor 9 drives by the motor 23. more specifically Step on a stage to the degree of target blow-off temperature at the time of motorised [which was calculated at Step 54], and it is made to change from the degree of target blow-off temperature at the time of the compressor drive which calculated the degree of target blow-off temperature at Step 52 to it gradually. It realizes by adjusting the opening of the air mix door 13, and the rotational frequency (ventilation capacity) of a blower 7 so that this changing degree of target blow-off temperature may be followed etc.

[0031] Therefore, it sets in process after an internal combustion engine condition precedent is ready until the driving source of a compressor 9 changes from an internal combustion engine 22 to a motor 23. A stage is gradually stepped on and dropped on the cooling capacity at the time of using cooling capacity of an air conditioner as a motor 23 for the driving source of a compressor 9 from the cooling capacity at the time of considering as an internal combustion engine 22. Injuring a feeling is lost, even if there is no rapid change of cooling capacity and the driving source of a compressor 9 changes to a motor 23 like before, since an internal combustion engine 22 is suspended after an appropriate time and the driving source of a compressor 9 was switched to the motor 23.

[0032] Moreover, according to the composition to which a switch on a motor is carried out in this way, since it must be necessary to stop always having to work the internal combustion engine 22 at the time of air conditioning in order to secure cooling capacity, saving of the mpg of an internal combustion engine 22 can be aimed at, and the request of the improvement in mpg and the request of improvement in the air-conditioning environment of the vehicle interior of a room can be reconciled.

[0033] Furthermore, according to this composition, the difference (deltaX=X1-X2) of the degree X1 of target blow-off temperature and the degree X2 of target blow-off temperature is beyond the predetermined value alpha (delta X>=alpha). in addition -- and, when the conditions (internal combustion engine condition precedent) for switching the driving source of a compressor 9 to a motor 23 from an internal combustion engine 22 are ready and the predetermined time has passed since motorised [last] After T is set as tau at Step 66 and this time tau passes in order to suppress a

switch of the driving source of a compressor 9 as much as possible since crew is familiar with cool in case the driving source of a compressor 9 is an internal combustion engine 22, cooling inhibitory control of drawing 4 (b) is performed.

[0034] on the other hand, the difference (deltaX=X1-X2) of the degree X1 of target blow-off temperature and the degree X2 of target blow-off temperature smaller (delta X<alpha) than the predetermined value alpha in addition -- and, when the conditions (internal combustion engine condition precedent) for switching the driving source of a compressor 9 to a motor 23 from an internal combustion engine 22 are ready and the predetermined time has not passed yet since motorised [last] According to the number of times by which the driving source was switched to the motor 23 from the internal combustion engine 22, i.e., the change frequency of the driving source of a compressor 9, after starting the time check of the timer of Step 68, the start time T of cooling inhibitory control calculates.

[0035] This cooling inhibitory-control start time T becomes so short that the change frequency of the driving source of a compressor 9 is so high that there is much number of times by which the driving source of a compressor 9 was switched to the motor 23 from the internal combustion engine 22 since it is computed by tau/n. That is, if the driving source of a compressor 9 changes to the motor 23 repeatedly until now, crew The temperature of the vehicle interior of a room closely in the air conditioning state when it rises and the compressor 9 is driving by the motor 23 from having become In this case, even if it shifts to cooling inhibitory control promptly, injuring a feeling controls cooling capacity to become the property which shortens start time T of cooling inhibitory control, so that the change frequency of a driving source is high, since there is almost nothing, for example, is shown with the dashed line of drawing 4 (b).

[0036] That is, according to this composition, the somesthesis of the crew who changes according to the switch frequency of the driving source of a compressor 9 is taken into consideration, and it becomes realizable [the air-conditioning control make the sense of incongruity accompanying cooling capacity change hard to give at the time of a switch].

[0037] If the difference (deltaX=X1-X2) of the degree X1 of target blow-off temperature and the degree X2 of target blow-off temperature is beyond the predetermined value alpha according to above-mentioned composition, further again Cooling inhibitory control is performed, and since the sense of incongruity accompanying the cooling capacity change at the time is small, it is made to switch the driving source of a compressor 9 to a motor 23 promptly from an internal combustion engine 22 by switching, even if it switches a driving source to a motor 23 suddenly from an internal combustion engine 22, if smaller than alpha. For this reason, when the difference

(deltaX=X2-X1) of the degree X1 of target blow-off temperature and the degree X2 of target blow-off temperature is small, it can switch to motorised promptly, motorised time can be lengthened, and improvement in the mpg of the part and an internal combustion engine 22 can be aimed at. That is, since it is not necessary to delay a switch even when the cooling capacity change at the time of a switch is small, the request of the improvement in mpg and the request of improvement in the air-conditioning environment of the vehicle interior of a room can be reconciled by switching a motor 23 promptly in the stage in which the internal combustion engine condition precedent was ready in such a case.

[0038] In addition, in above-mentioned composition, although the case where an internal combustion engine 22 was used as a driving gear for rolling stock runs was shown, when changing from the motor for a run to a different motor 23 for a compressor drive from this like an electric vehicle also in the thing using the motor for a run as a driving gear for a run, it can use similarly, and the same operation effect as **** is done so also in this case.

[0039] Moreover, although the case where it constituted as what detects that the vehicle speed became zero as an internal combustion engine condition precedent detection means 37 in above-mentioned composition was shown Like [in the case of changing from driving gears for a run, such as an internal combustion engine 22, to a motor 23 by the case where the stable run is being carried out etc. when vehicles do not necessarily need to stop and the low-speed run is being carried out by traffic congestion] You may detect or judge that the conditions which stop the driving gear for a run in a certain form were ready.

[0040]

[Effect of the Invention] After being judged with the conditions which suspend the driving gear for a run having been ready according to the air conditioner for vehicles which was described above and which is applied to this invention like Step on a stage to cooling capacity in case a compressor drives cooling capacity in case a compressor drives with the driving gear for a run by the motor, and it is made to shift to it. Since the driving source of a compressor was changed from the driving gear for a run to the motor after an appropriate time, the displeasure accompanying change of the cooling capacity produced in case the driving source of a compressor changes from the driving gear for a run to a motor can be reduced. Moreover, the time which makes the driving gear for a run drive for air conditioning according to such control can be reduced as usual, and if the driving gear for a run is an internal combustion engine, the request of saving of mpg and the request which aims at improvement in the comfortable air-conditioning

environment at the time of air conditioning can be reconciled.

[0041] Moreover, the composition which makes so short that the change frequency of the driving source of a compressor is high time after being judged with the conditions which stop the source of power of vehicles having been ready until shift of cooling capacity is started, then change frequency can make the sense of incongruity accompanying change of cooling capacity hard to sense for a low case, since shift control of cooling capacity is performed so that the inclination may be maintained. Moreover, conversely, when change frequency is high, since there is no resistance in considering as the cooling capacity at the time of making a compressor drive by the motor not much, by shortening time until shift of cooling capacity is started, the shift to the motor of a driving source can be performed promptly, and the load of the driving gear for a run can be reduced.

[0042] Furthermore, if it considers as the composition which performs shift of the cooling capacity by the cooling capacity shift means when a difference with cooling capacity in case a compressor drives by cooling capacity and a motor in case a compressor drives with the driving gear for a run is more than a predetermined size By giving change of the cooling capacity which stepped on the stage in such a case, since it is easy to produce sense of incongruity so that change of the cooling capacity at the time of changing a driving source becomes large The displeasure accompanying change of cooling capacity can be reduced, when change of the cooling capacity at the time of a driving source changing is small, a driving source can be promptly switched to a motor from the driving gear for a run as usual, and reduction of the load of the driving gear for a run can be aimed at.

[Brief Description of the Drawings]

[Drawing 1] Drawing 1 is drawing showing the example of composition of the air conditioner for vehicles concerning this invention.

[Drawing 2] Drawing 2 is a flow chart which shows the example of control action in the control section shown by drawing 1 .

[Drawing 3] Drawing 3 is a flow chart which shows an outline for internal combustion engine drive space-time tone control of drawing 2 , or motorised space-time tone control.

[Drawing 4] Drawing 4 is the ultimate lines which showed the change to the cooling capacity at the time of motorised at the time of an internal combustion engine drive from cooling capacity with the degree of blow-off temperature. drawing 4 (a) A property when the difference (deltaX=X1-X2) of the degree X1 of target blow-off temperature at the time of motorised and the degree X2 of target blow-off temperature at the time of an internal combustion engine drive is smaller than the predetermined value alpha

drawing 4 (b) It is drawing showing a property in case the difference (deltaX=X1-X2) of the degree X1 of target blow-off temperature at the time of motorised and the degree X2 of target blow-off temperature at the time of an internal combustion engine drive is beyond the predetermined value alpha, respectively.

[Description of Notations]

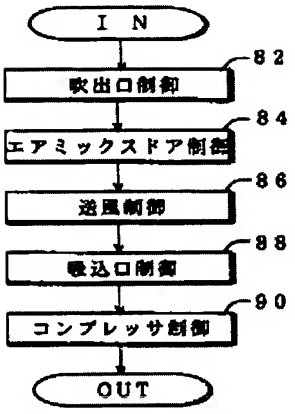
9 Compressor

22 Internal Combustion Engine

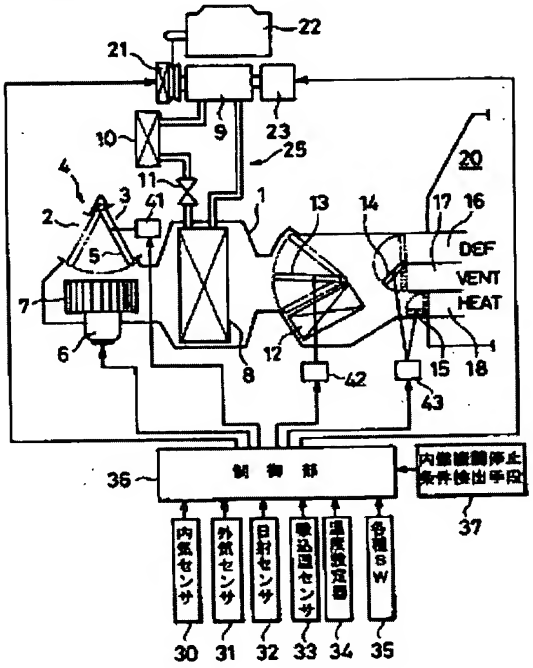
23 Motor

25 Refrigerating Cycle

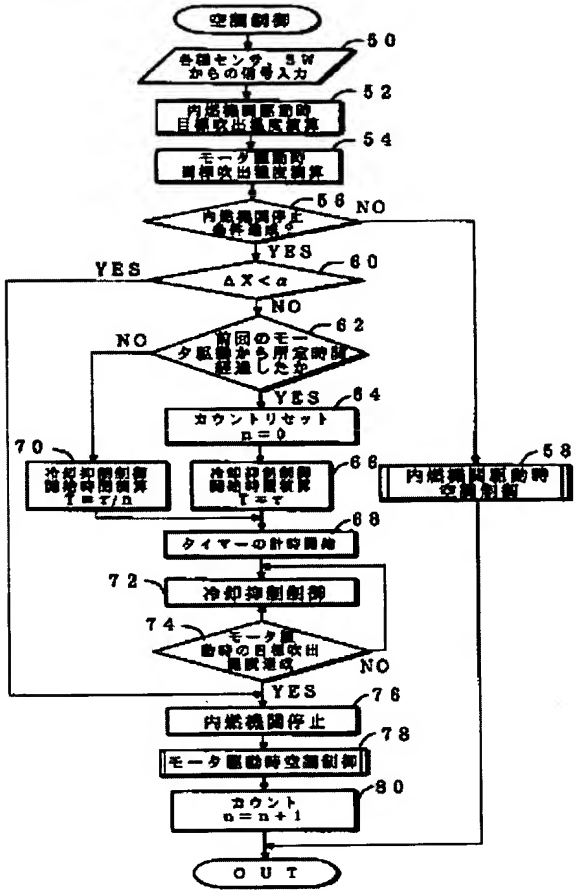
[Drawing 3]



[Drawing 1]



[Drawing 2]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52
54
56
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YES
60
YES
NO
62
NO
YES
64
70
66
58
68
72
74
NO
YES
76
78
80
OUT

[Drawing 4]